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Agricol, Clay and Water Dipping Tests with Jack Pine and Black Spruce Nursery Stock

by

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In the fall of 1973, a test was started at Swastika Nursery to study dipping treatments for root protection of nursery stock. Selected nursery beds of regular shipping stock of 2+0 jack pine (*Pinus banksiana* Lamb.) and 3+0 black spruce (*Picea mariana* (Mill.) B.S.P.) were laid out. A randomized replication of plots provided trees for fall lifting (18 and 30 October 1973) for overwinter storage and spring lifting (21 May, 17 June, 15 July 1974) for controls. In the fall the trees were loosened by machine, pulled by hand, and tied in bundles of 25. The bundles were taken to the shipping barn where the following root dipping treatments were applied:

Agricol[1]: dipped up and down gently for about 10 seconds in a slurry of Agricol (1 pound to 10 gallons water, or approximately 0.5 kg Agricol to 42 ℓ of water).
Clay: dipped as above for about 10 seconds in a clay slurry (local grey clay with equal parts of water).
Water: dipped in water for about 10 seconds.
Dry: no dipping.

After treatment, the bundles were packed in polyethylene-lined Kraft bags with a handful of moss at top and bottom, then stored overwinter at about -3°C until planted the following year. Lifting procedures in the spring were similar to those in the fall but treating and packing were done in the field. The bags were stored in the shade at ambient temperatures until planting, which occurred the same or the following day to lifting.

There were three periods of spring (1974) planting: 21 and 22 May, 17 and 18 June, and 15 and 16 July. Flushing of the 1974 buds occurred in the control stock as the season advanced. Each planting consisted of 1500 trees of each species, 9000 in total.

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[1]Agricol: registered trademark of Alginate Industries Ltd., Chipman Chemicals Ltd., Stoney Creek, Ontario.

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TABLE 1 Characteristics of the planting stock from Swastika Nursery at times of lifting (each observation based on 50 trees)

Date of lifting	Top length cm (1973)	Terminal length cm (1974)	Stem diameter cm	Oven-dry weight[a] g	Top-root ratio[a] ODW basis
Jack pine, 2+0					
Oct. 18, 1973	14.7	0.7	.36	3.16	4.35
Oct. 30, 1973	15.0	0.7	.37	3.72	5.19
May 21, 1974	15.8	2.6	.35	3.68	5.75
June 17, 1974	14.3	21.1	.44	5.18	6.00
July 15, 1974	15.0	28.0	.43	6.66	9.42
Black spruce, 3+0					
Oct. 18, 1973	28.9	0.5	.47	5.55	4.63
Oct. 30, 1973	30.0	0.5	.47	6.13	4.85
May 21, 1974	27.7	0.5	.45	5.90	4.36
June 17, 1974	28.4	2.4	.40	5.40	5.60
July 15, 1974	27.7	14.1	.42	6.50	6.99

[a]Armson and Carman (1961) give the following standards:

Jack pine 2+0: ODW, large 2.61 - 3.40 g; very large over 3.40 g
T/R, maximum 4.0:1
Black spruce 3+0: ODW, very large, over 4.00 g
T/R, maximum 3.2:1

Samples were taken for laboratory measurement to provide stock characteristics (Table 1). Both species were in the large to very large stock classes and somewhat top-heavy for good planting material (Armson and Carman 1961).

Results and Discussion

Aggregate height at the end of the second year shows a significant reduction in growth caused by late planting (Table 2). It is reasonable therefore, to examine the effects of the treatments of lifting dates and dipping in terms of the more normal and successful planting, which is Plant 1 (21 and 22 May 1974).

There were no significant differences in survival or growth due to time of lifting for either species in this first planting. The fall lifts were as good as the spring controls. In the dipping treatments there were only minor differences (Table 3). The survival of jack pine after the water dipping treatment was significantly poorer than that for the other treatments.

TABLE 2 Aggregate height at second year in centimetres per hectare (planting density per hectare x survival percent x average height in centimetres)

	Plant 1	Plant 2	Plant 3
Jack pine	64 200	36 560	17 330
Black spruce	65 950	42 570	35 850

TABLE 3 Survival, total height, terminal length and aggregate height for Plant 1, by measurements at end of second growing season

	Survival	Total height	Terminal length	Aggregate height
	%	cm (1975)	cm (1975)	cm/ha
Jack pine				
Agricol	71.7	31.4	3.7	67 316
Clay	67.7	31.3	3.7	63 358
Water	64.3	30.5	3.4	58 631
Dry (no dip)	70.7	32.0	3.8	67 645
Significance[a]	*	NS	NS	N/A
Black spruce				
Agricol	78.4	27.0	13.9	63 292
Clay	86.7	26.5	13.7	68 696
Water	78.9	27.4	15.9	64 639
Dry (no dip)	78.7	28.2	17.4	66 358
Significance	NS	NS	NS	N/A

[a]Significance: * = significant at 5.0% level, NS = not significant, and N/A = test of significance not applicable.

In summary, for both species none of the dipping treatments of Agricol, clay or water were found better than dry packaging for both stored or fresh lifted planting stock. It is possible that the fifth-year measurements will yield more concrete results.

Reference

Armson, K.A. and R.D. Carman. 1961. Manual of forest tree nursery soil management. Ontario Dep. Lands Forests, Timber Br. 74 p.